

# Western Gull Rust

Western gall rust, caused by the rust fungus *Endocronartium harknessii*, is a branch and stem disease of various pine species. (Figures 1 & 2). It occurs throughout Idaho but damage is more severe in the south.



Figure 1: Typical, mid-sized gall of western gall rust

## Biology

Rust fungi can have variously complex life cycles, producing up to five spore types and needing to infect two non-related hosts. The life cycle of western gall rust, however, is relatively simple. It produces only 2 or 3 types of spores and does not require an alternate host to complete its life cycle; the fungus spreads directly from pine-to-pine.



Figure 2: Trunk or "hip" canker on stem of mature tree

Yellow to orange, blister-like fruiting structures form on the woody branch galls, and sometimes the margins of trunk cankers, in late spring and early summer (Figure 3).

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## Insect and Disease

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# WESTERN GULL RUST

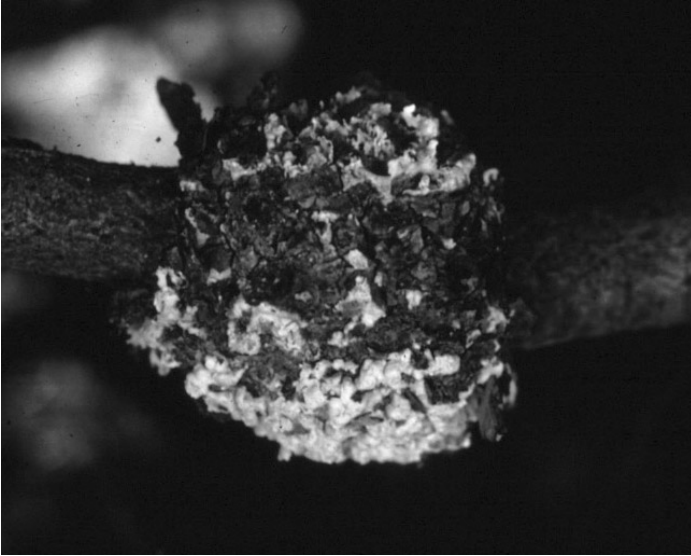


Figure 3: Sporulation from gall

These rupture and release windborne spores that infect the green, succulent tissue of expanding pine shoots.

During certain years, known as “wave years”, the conditions for rust infection are optimal. Due to the numerous infections that can take place on same-year shoot growth during a wave year many galls subsequently form on shoots of the same age class or, in time, at the same position on tree stems.

After infection takes place galls begin to form, first as inconspicuous swellings, then continuing to grow each year till they can eventually reach softball-sized proportions. Galls are perennial; the woody tissue and the fungus remain alive. Sporulation, or production of fungus spores from the gall, begins the year after infection occurs and can continue as long as the gall is alive.

Galls located near the end of branches often die because of secondary fungi and insects that infest the gall and girdle the branch. This kills the portion of the branch beyond where the gall was located, thus causing a “flag”, or dead branch with red foliage, to be visible (Figure 4).

## **Pine Hosts**

Susceptible: Ponderosa pine and lodgepole pine; ornamentals such as scotch pine.

Non-susceptible: Western white pine, whitebark pine, and limber pine.

## **Disease Recognition**

Western gall rust is easily recognized because it forms variously-sized, spindle-shaped, oval, or round galls on infected trees (see Figures 1 & 2). Galls form frequently on branches but may also



Figure 4. Shoot dieback on ends of branches in mature, heavily-infected ponderosa pine

form on the bole of young trees. When the fungus is fruiting in the early summer the surface of galls can appear bright-yellow to -orange over their entire surface and are readily visible. Rodent-feeding is often evident on and around branch galls due to the sugar content of infected tissues. On the main stems of larger trees galls can continue to develop for many years and form large cankers called trunk or “hip” cankers (see Figure 2).

## **Damage**

Mortality, growth loss, and defect are the main types of damage caused by severe infections of western gall rust, but their impact varies greatly by locality and tree age. Mortality is most common

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when seedlings and saplings are infected, but sometimes poles and small sawtimber-size trees are killed. Some trees, particularly ponderosa pine, can develop hundreds of branch cankers and suffer growth reductions. Defect caused by western gall rust is due to trunk cankers; lodgepole pine are sometimes highly deformed (Figure 5).



**Figure 5:** Lodge pole pine stem deformed by several gall rust cankers

Tree stems are frequently weakened where cankers occur and can break in the wind, so trees with trunk cankers in recreation sites or near homes can pose a hazard.

High-value ponderosa pine, such as those around homes or in city parks, can lose aesthetic appeal due to numerous branch galls and the subsequent shoot mortality and branch disfigurement that can occur throughout the crown (see Figure 4). Similar damage can be caused, however, by other pine branch and terminal insects and diseases.

## **Management**

Removal of infected trees is the only practical way to manage western gall rust. During commercial harvest trees with trunk cankers or having more than 25 percent of their branches infected should be removed; a moderate number of branch galls should not affect the general health and vigor of a tree. Heavily infected trees should not be retained as seed trees because seed production may be reduced. In addition there is a genetic component to susceptibility and infected seed trees are more likely to produce susceptible regeneration. Similarly, seed should not be collected from stands with high levels of western gall rust. Infected nursery and ornamental stock should be destroyed as soon as galls are recognized because of the potential for pine-to-pine spread.

During precommercial thinning in ponderosa or lodgepole pine stands infected by western gall rust the hierarchy for tree removal should be: 1) trees with stem cankers, 2) trees with high numbers of branch cankers, and 3) trees with a moderate number of branch cankers.

Pruning branch galls can reduce risk of new infections, either within the same tree or to surrounding trees, and is practical for high-value trees or groups of trees. Pruning does not need to remove an entire branch on which a gall occurs; simply prune the branch several inches behind the gall or at the nearest branch-node behind the gall.

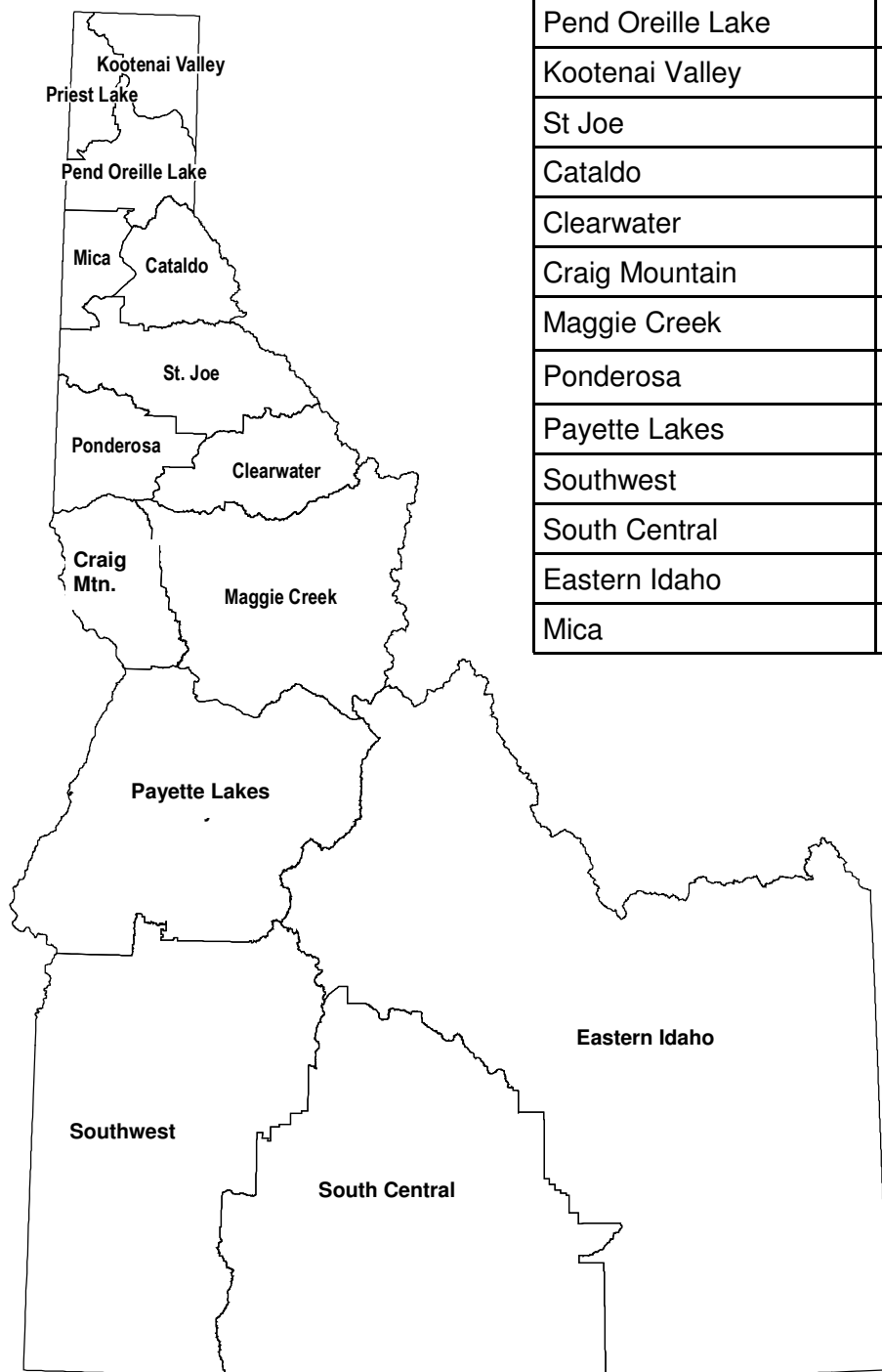
Preventative fungicide sprays can be used on high-value trees during the period of spore release, but treatment likely needs to be repeated twice each growing season in order to keep the tissues of susceptible shoots adequately protected as they expand.

## **Required acknowledgements:**

Photo credits: USFS Region 1 Forest Health Protection staff, "Forestry Images" (<http://www.forestryimages.org/>), and Ferguson Forest Pathology Consulting, Inc.



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